HYDROGEN
JURNAL KEPENDIDIKAN KIMIA
https://e-journal.undikma.ac.id/index.php/hydrogen/index

August 2025. 13(4)
e-ISSN: 2656-3061
p-ISSN: 2338-6487
pp. 932-941

Analysis of Students' Learning Difficulties in Science on the Topic of Additive Substances at Junior High School

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Article History
Received: 14-08-2025
Revised: 21-09-2025
Published: 29-09-2025

Keywords: Learning difficulties, internal factors, external factors, additive substances, science, junior high school.

Abstract
This study aims to describe students' learning difficulties in science subjects on the topic of additive substances at SMP Swasta Sivaliputta Kubu Raya and to identify the factors contributing to these difficulties. The research employed a descriptive quantitative method, with data collected through questionnaires, unstructured interviews, observations, and documentation. The study involved 36 eighth-grade students as participants. The findings indicate that learning difficulties are influenced by internal factors, particularly study habits (49%), which fall into the category of "moderately experiencing difficulties."This study recommends the implementation of interactive and contextual learning strategies, as well as the reinforcement of independent study habits, to improve students" understanding of science subjects, particularly the topic of additive substances.

How to Cite: Sari, L., Enawaty, E., & Sahputra, R. (2025). Analysis of Students' Learning Difficulties in Science on the Topic of Additive Substances at Junior High School. Hydrogen: Jurnal Kependidikan Kimia, 13(4), 931–941. https://doi.org/10.33394/hjkk.v13i4.17120

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INTRODUCTION

Education in Indonesia has undergone various changes in curriculum and teaching methods to improve the quality of education, particularly in the subject of Science. Science is one of the essential subjects that teaches fundamental concepts about the universe, life, and natural phenomena that play a role in everyday life (Kemdikbud, 2017). Despite the implementation of various instructional strategies by teachers, many students still experience difficulties in understanding science concepts, both theoretically and in their application (Siahaan & Suryani, 2021).

Learning difficulties are one of the common problems experienced by students. According to Supriyanto (2018), learning difficulties refer to a condition in the learning process characterized by specific obstacles that hinder the achievement of optimal learning outcomes. Meanwhile, Sugihartono et al. (2016) state that learning difficulties can be identified through low student achievement that falls below the Minimum Mastery Criteria (KKM). Therefore, identifying learning difficulties is crucial to determine and map the contributing factors, enabling teachers to provide appropriate solutions and prevent similar difficulties from occurring in the future.

Based on the observation data and documented scores at SMP Swasta Sivaliputta Kubu Raya, it was found that students' learning outcomes in Science subjects were significantly below the Minimum Mastery Criteria (KKM). For the topic *"The Role of Sunlight for Life on Earth"*, approximately 64% of students achieved the Learning Objective Achievement Criteria (KKTP), while 36% were still below the KKM. In the topic *"Classification of Living Things"*, around 60% met the KKTP and 40% remained below the KKM. For the topic *"Biodiversity"*, approximately 50% reached the KKTP, whereas the remaining 50% were below the KKM.

One of the science topics that often becomes a source of learning difficulties, particularly in eighth grade, is the topic of additive substances. Based on interviews with science teachers at Private Junior High School Sivaliputta Kubu Raya, one of the main problems experienced by students is the inability to distinguish between additive substances and addictive substances. This lack of understanding leads to misconceptions about the functions, benefits, and impacts of using these substances in daily life, thereby hindering students' comprehension in subsequent lessons related to chemistry and health. According to Rahmawati et al. (2017), the topic of additive substances is considered abstract yet closely related to everyday life; however, many students lack direct experience or sufficient understanding to connect it with scientific concepts. This results in confusion, particularly in differentiating between similar scientific terms with significantly different meanings, such as the additive substances (additives in food) and addictive substances (substances that cause dependence, such as narcotics).

Based on these issues, further research is needed to identify students' learning difficulties and their contributing factors, particularly in the topic of additive substances in science lessons. This study is expected to provide a clear overview of the obstacles faced by students and serve as a basis for determining appropriate solutions. Therefore, the researcher conducted a study entitled: *"Analysis of Students' Learning Difficulties in Science Subjects on the Topic of Additive Substances at SMP Swasta Sivaliputta Kubu Raya."*

METHOD

The type of research employed in this study is descriptive quantitative research. Descriptive research aims to systematically describe the facts or characteristics of a particular population or phenomenon. This type of research does not seek to determine relationships or effects between variables but rather aims to provide an overview of the actual condition of a variable (Sugiyono, 2016). In this study, the descriptive research design was used to describe the level of students' learning difficulties in science subjects on the topic of additive substances.

This research was conducted at SMP Swasta Sivaliputta Kubu Raya, located at Jl. Parit Nomor Dua, Gang Flamboyan 3B, Parit Baru, Sungai Raya District, Kubu Raya Regency. The implementation of this study took place in the 2024/2025 academic year.

The data sources refer to the subjects from which data can be obtained, which may include literature or individuals. In this study, the sources were derived directly from the field. Field data were collected through observations, interviews, questionnaires, and documentation. The research subjects were eighth-grade students, with a total of 36 participants.

Data Collection Techniques

The data collection techniques used by the researcher in this study were carried out through:

a. **Unstructured Observation**: According to Sugiyono (2015), observation is one of the data collection techniques used to directly observe phenomena occurring in the field or research objects systematically in order to obtain the necessary information. In this study, unstructured observation was employed, in which the researcher directly engaged in observing the learning activities taking place in the classroom. This was conducted to identify the activities of both teachers and students during the learning process.

b. **Questionnaire**: A questionnaire is a data collection technique conducted by providing a set of written questions or statements to respondents for them to answer (Sugiyono, 2015). The purpose of distributing the questionnaire is to obtain complete information regarding a particular issue while allowing respondents to feel comfortable, even if their answers do not fully align with reality, when completing the questionnaire form (Riduwan, 2014). In

this study, the learning difficulties questionnaire was developed using a Likert Scale. According to Riduwan (2014), the Likert scale is used to measure interest, motivation, study habits, teaching methods, facilities and infrastructure, as well as the social environment.

Table 1.1 *Likert* scale

Positive (+)		**Negative (-)**	
Answer Criteria	**Skor**	**Answer Criteria**	**Skor**
Sangat Setuji (SS)	4	Sangat Setuji (SS)	1
Setuju (S)	3	Setuju (S)	2
Tidak Setuju (TS)	2	Tidak Setuju (TS)	3
Sangat Tidak Setuju (STS)	1	Sangat Tidak Setuju (STS)	4

Modified from **Sugiyono, 2025**

c. **Interview**: An unstructured interview, according to Sugiyono (2019), is a free-form interview in which the researcher does not use a systematically and completely arranged interview guide to collect data. In this study, unstructured interviews were used with the aim of obtaining in-depth information from respondents, providing them with the space to freely express their thoughts and feelings.

d. Documentation: According to Sugiyono (2017), documentation is a data collection method conducted by reviewing written documents, images, or monumental works relevant to the research object. This technique is important for obtaining historical and administrative data that cannot be acquired through observation or interviews. In this study, the documentation collected consisted of students' daily test scores on the topic of additive substances at SMP Swasta Sivaliputta Kubu Raya.

Research Instrument

Table 1.2 Research Instrument

No.	**Activity**	**Focus**
1.	Questionnaire	Main points in the student questionnaire: Causes of learning difficulties a. Internal factors b. External factors
2.	Interview	Unstructured questions, asked to students.
3.	Observation	- Aktivitas belajar peserta didik di kelas IPA. - Perhatian peserta didik terhadap penjelasan guru. - Interaksi peserta didik dengan guru dan teman sebaya.

Data Analysis Technique

Before being analyzed, the data were first processed systematically by summarizing the results of observations, interviews, recordings, questionnaires, and documentation. Subsequently, the data were classified, reduced, and presented in accordance with the research focus. This process was carried out simultaneously from the beginning of data collection in the field, so that the analysis activities took place concurrently with the data collection process.

To interpret the percentage data on students' learning difficulties, the researcher established classification criteria based on specific percentage ranges. These classifications were structured logically and proportionally to facilitate the categorization of students' learning difficulty levels into specific categories. The criteria are presented in Table 3.4 as follows:

Table 1.3. Criteria for student learning difficulties

Percentage (%)	Category
0 – 40%	High (Severe learning difficulties)
41 – 55%	Moderate (Quite difficult)
56 – 75%	Low (Having some difficulty)
76 – 100%	Tidak mengalami kesulitan

Source: Sugiyono (2019) dan Riduwan (2015)

These criteria were formulated by referring to the principles of converting quantitative data into qualitative data, as explained by Sugiyono (2017) and Arikunto (2015), who stated that research data can be classified into certain categories based on the obtained percentage results to facilitate descriptive analysis. In addition to the questionnaire data, this study also collected data through interviews with several students to reinforce the data obtained from the questionnaires.

In this study, broadly speaking, the data analysis consisted of three main steps: (1) data reduction, which involves creating abstracts or summaries; (2) data presentation, which entails presenting the key points while ensuring the validity of the data; and (3) drawing conclusions and verification, which involves formulating tentative conclusions, allowing for verification throughout the research process. These steps were carried out repeatedly in sequence, with the analysis occurring concurrently over time.

The data obtained from the respondent questionnaires were analyzed using a quantitative descriptive approach. The first step involved summing the total scores of each questionnaire item answered by each student. The questionnaire instrument consisted of 10 items, using a 4-point Likert scale, with the following categories:

Keterangan	+	-
Sangat Setuju (SS)	4	1
Setuju (S)	3	2
Tidak Setuju (TS)	2	3
Sangat Tidak Setuju (STS)	1	4

The total score obtained by each student was then converted into a percentage using the following formula:

$$\text{Percent} = \frac{\text{Score avalable}}{\text{maximum score}} \text{ X } 100\%$$

RESULTS AND DISCUSSION

The study was conducted at SMP Swasta Sivaliputta Kubu Raya involving 36 eighth-grade students. Data were collected through questionnaires, unstructured interviews, observations, and documentation. The questionnaire consisted of 10 statements based on six indicators of learning difficulties, covering internal factors (interest, motivation, and study habits) and external factors (teaching methods, facilities and infrastructure, and social environment).

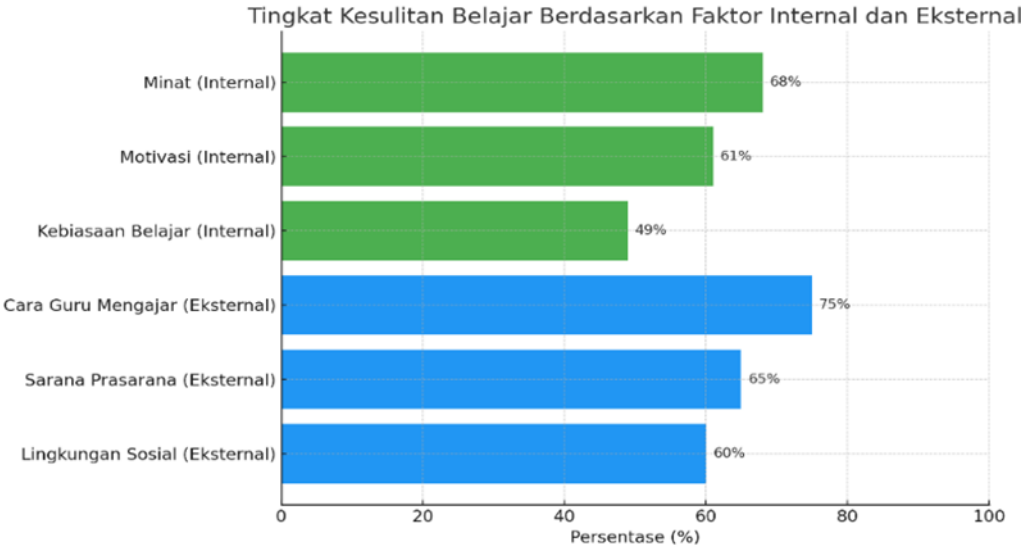

Figure 4.1. Graph of learning difficulty levels based on internal and external factors.

1. Internal Factors

a. Interest

Based on the analysis of interest in the students' learning difficulties questionnaire, the results are presented in Table 4.1.

Table 4.1. Percentage of Learning Difficulties Based on the Interest Aspect

No.	Aspect	Statement	P +	P -
1	Minat	I am not interested in learning about additives because I perceive that it has no practical benefits in my life.	39%	61%
		I am interested in learning more about science topics, specifically additives.	75%	25%
Maximum score		288		
Score obtained		195		
Average percentage		68%		
Criteria		Low (experiencing little difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The average percentage was 68% (low category / experiencing few difficulties). Most students showed initial interest in the topic of additive substances; however, some still perceived the material as less relevant.

b. Motivasi

Based on the analysis of motivation in the students' learning difficulties questionnaire, the results are presented in Table 4.2.

Table 4.2. Percentage of Learning Difficulties Based on the Motivation Aspect

No.	Aspect	Statement	P +	P -
1.	Motivasi	I feel happy when participating in science learning.	78%	22%
		I am diligent in studying the topic of additive substances.	72%	28%
Maximum score		288		
Score obtained		175		
Average percentage		61%		
Criteria		Low (experiencing little difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The percentage is 61% (low). Overall, students generally enjoy participating in science lessons and are diligent in studying, although some still become bored quickly.

c. Study Habbit

Based on the analysis of learning habits, students' learning difficulties can be seen in Table 4.3.

Table 4.3. Percentage of Learning Difficulties Based on the Study Habit Aspect

No.	Aspect	Statement	P +	P -
1.	Kebiasaan belajar	I am unable to manage my time to study every day.	78%	22%
Maximum score		144		
Score obtained		70		
Average percentage		49%		
Criteria		Moderate (experiencing some difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The percentage is 61% (low). In general, students enjoy participating in science learning and are diligent in studying, although some still get bored quickly.

2. External Fctors

a. Teaching Method

Based on the analysis of the teacher's teaching methods, students' learning difficulties can be seen in Table 4.4.

Tebel 4.4. Percentage of Learning Difficulties Based on the Teacher's Teaching Method Aspect

No.	Aspect	Statement	P +	P -
1.	Cara guru mengajar	Saya kesulitan mengikuti pembelajaran karena guru menjelaskan materi (materi zat aditif)terlalu cepat.	86%	14%
		Guru menjelaskan materi menggunakan bahasa yang sulit dipahami.	86%	14%
Maximum score		288		
Score obtained		217		
Average percentage		75%		
Criteria		Low (experiencing little difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The percentage is 75% (low). The majority of students do not experience difficulties in understanding the material delivered by the teacher, although some perceive the explanations as too fast.

b. Infrastructure

Based on the analysis of facilities and infrastructure, students' learning difficulties can be seen in Table 4.5.

Table 4.5. Percentage of Learning Difficulties Based on the Facilities and Infrastructure Aspect

No.	Aspect	Statement	P +	P -
1	Sarana dan prasarana	Alat praktikum yang terbatas membuat saya tidak maksimal untuk melakukan praktikum (materi zat aditif)	64%	36%
Maximum score		144		
Score obtained		94		
Average percentage		65%		
Criteria		Low (experiencing little difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The limited laboratory equipment prevents me from performing experiments on additive substances optimally.

c. Social Environment

Based on the analysis of the social environment, students' learning difficulties can be seen in Table 4.6 below.

Tebel 4.6. Percentage of Learning Difficulties Based on the Social Environment Aspect

No.	Aspect	Statement	P +	P -
1.	Lingkungan sosial	I enjoy group learning because I can discuss with my classmates.	33%	67%
		I diligently study science because my family always provides support and motivates me to learn science materials at home.	70%	30%
Maximum score		288		
Score obtained		173		
Average percentage		60%		
Criteria		Low (experiencing little difficulty)		

Keterangan:

P + : persentase yang menjawab sangan setuju dan setuju

P - : persentase yang menjawab tidak setuju dan sangat tidak setuju

The percentage is 60% (low). Students rarely engage in group learning, but most receive family support for studying.

1. Kesulitan Belajar Peserta Didik dalam Mata Pelajaran IPA di SMP Swasta Sivaliputta Kubu Raya

After the data were systematically analyzed, the discussion of the study on students' learning difficulties in the science subject on additive substances was conducted. This study aimed to describe students' learning difficulties in the science subject on additive substances at SMP Swasta Sivaliputta Kubu Raya and to identify the factors contributing to these learning difficulties. The results obtained from questionnaires, interviews, and observations indicated that eighth-grade students at SMP Swasta Sivaliputta Kubu Raya experienced learning difficulties in science, particularly on the topic of additive substances. These learning difficulties were influenced by two main factors: internal and external factors.

Table 4.7 Persentase faktor penyebab kesulitan belajar

Faktor	Aspek	Persentase Aspek (%)	Kategori Aspek	Persentase Faktor	Kategori Faktor
Internal	Minat	68%	Rendah	59%	Rendah
	Motivasi	71%	Rendah		
	Kebiasaan Belajar	49%	Sedang		
Eksternal	Cara Guru Mengajar	75%	Rendah	67%	Rendah
	Sarana dan Prasana	65%	Rendah		
	Lingkungan Sosial	60%	Rendah		

The average percentage for internal factors was 59% (low), and for external factors, it was 67% (low). Internal factors contributed more to learning difficulties than external factors. The aspect with the highest level of difficulty was study habits (49%, moderate).

Interviews indicated that students with irregular study habits tended to have difficulty understanding the material. Observations revealed that students' focus in class was still low, and some students only took partial notes of the material.

CONCLUSION

Based on the results of the study, it can be concluded that eighth-grade students at SMP Swasta Sivaliputta Kubu Raya experienced learning difficulties in the science subject on additive substances, which were influenced by internal factors. The dominant internal factor was irregular study habits, with a percentage of 49% (moderate level of difficulty).

RECOMMENDATIONS

For Teachers it is recommended to enhance students' discipline and study routines through consistent scheduling, to encourage active questioning when encountering learning difficulties, and to foster self-motivation by relating lesson content to real-life contexts. For Future Researchers. Subsequent studies are expected to identify concrete solutions for improving students' study habits and to explore additional psychological factors, such as academic anxiety or students' self-confidence in learning science.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to all parties who have provided support during the implementation of this research. Appreciation is extended to the validators, respondents, and SMP Swasta Sivaliputta Kubu Raya for their cooperation and support throughout the research process. The author also wishes to thank the academic supervisors for their guidance and direction.

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